

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

JCWSCS 17 JUN 2004

JUN. 17. 2004 9:42AM

HP LEGAL

NO. 4499 P. 1

I hereby certify that this correspondence is being facsimile transmitted to the Patent Trademark Office on the date shown below:

Typed Name of Person Signing Certification: Ramona J. Zaya

Dated: 17 June 2004

Attn: Application Processing Division  
Customer Correction Branch  
United States Patent and Trademark Office

Fax No: 703-746-9195

3rd REQUEST

Regarding:

Patent Application:

Inventor: Ah Chong TEE, Bee Bee ANG, Cherng Linn TEO  
Serial No: 10/618,402  
Filed: July 11, 2003  
Title: Inkjet Capping Elevator

Please note that the attached Filing Receipt does not contain the correct spelling of the second inventor's name. I have attached a copy of the Certificate of mailing and filing for verification.

IS

Should be

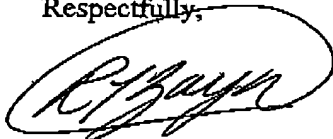
**Bee Be Ang**

**Bcc Bee Ang**

Applicants respectfully request the correction of the official records to show corrected data. Please forward a corrected Filing Receipt at your earliest convenience.

If you have any questions or concerns please feel free to contact me directly. Thank you for your assistance in this matter.

Respectfully,



Ramona J. Zaya  
Legal Administrator

Enclosures  
Filing Receipt  
Copy of filed application  
Copy of returned post card

Hewlett-Packard Company  
1501 Page Mill Road M/S 1197  
Palo Alto, Ca 94034  
Tele: 650-857-3058 fax: 650-8528063  
ramona.zaya@hp.com



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1458  
Alexandria, Virginia 22313-1458  
www.uspto.gov

APPL NO.	FILING OR 371 (c) DATE	ART UNIT	FIL FEE REC'D	ATTY DOCKET NO	DRAWINGS	TOT CLMS	IND CLMS
10/618,402	07/11/2003	2861	880	700110519-1	3	12	2

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

**RECEIVED**

JUN 07 2004

HP LEGAL  
IPA

CONFIRMATION NO. 5530

REPLACEMENT FILING RECEIPT



\*OC000000012840684\*

Date Mailed: 06/02/2004

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

## Applicant(s)

Ah Chong Tee, Singapore, SINGAPORE;

Bee Be Ang, Singapore, SINGAPORE;

Cherng Linn Teo, Singapore, SINGAPORE;

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 10/08/2003

Projected Publication Date: 01/13/2005

Non-Publication Request: No

Early Publication Request: No

## Title

Inkjet capping elevator

Preliminary Class

347

---

**LICENSE FOR FOREIGN FILING UNDER**  
**Title 35, United States Code, Section 184**  
**Title 37, Code of Federal Regulations, 5.11 & 5.15**

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Office of Export Administration, Department of Commerce (15 CFR 370.10 (j)); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

Dear Sir:

Please acknowledge receipt of the following document(s)

RE: U.S. Patent Application PD No.700110519-1 Atty: RBM

Inventor(s): Ah Chong Tee, et al

Title: A Horizontally Transferable Canning Mechanism

☒ Transmittal Letter, (in duplicate)

8 Page(s) of specification, claims & abstract; 8 claims total

☒ Declaration and Power of Attorney signed or ☒ unsigned or partial)

3 Sheet(s) of drawings

☒ Certificate of Mail dated July 11, 2003

Label No. EV104130542US

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P. O. Box 272400  
Fort Collins, Colorado 80527-2400

## PATENT APPLICATION

ATTORNEY DOCKET NO. 700110519-1

IN THE U.S. PATENT AND TRADEMARK OFFICE  
Patent Application Transmittal Letter

Mail Stop Patent Application  
Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is a(n): ☒ Utility ☐ Design☒ original patent application,☐ continuation-in-part application

INVENTOR(S): Ah Chong TEE et al

TITLE: A Horizontally Transferable Capping Mechanism

Enclosed are:

☒ The Declaration and Power of Attorney. ☐ signed ☒ unsigned or partially signed☒ 3 sheets of drawings (one set) ☐ Associate Power of Attorney☐ Form PTO-1449 ☐ Information Disclosure Statement and Form PTO-1449☐ Priority document(s) ☐ (Other) (fee \$ )


CLAIMS AS FILED BY OTHER THAN A SMALL ENTITY				
(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) TOTALS
TOTAL CLAIMS	8 — 20	0	X \$18	\$ 0
INDEPENDENT CLAIMS	1 — 3	0	X \$84	\$ 0
ANY MULTIPLE DEPENDENT CLAIMS	0		\$280	\$ 0
BASIC FEE: Design ( \$330.00 ); Utility ( \$750.00 )				\$ 750
TOTAL FILING FEE				\$ 750
OTHER FEES				\$
TOTAL CHARGES TO DEPOSIT ACCOUNT				\$ 750

Charge \$ 750 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

"Express Mail" label no. EV104130542 US

Date of Deposit 7-11-03

I hereby certify that this is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: Commissioner for Patents, Alexandria, VA 22313-1450.

By   
Typed Name: T. Henry D. Turner

Respectfully submitted,

Ah Chong TEE et al

By 

Richard B. Main

Attorney/Agent for Applicant(s)

Reg. No. 33,258

Date: 7-8-2003

Telephone No.: (650) 857-3974

PDNO: 700110519  
Ah CHONG, et al.

5

# INKJET CAPPING ELEVATOR

## Field of Invention

10 The present invention relates generally to inkjet printers, and more particularly to inkjet printer capping mechanisms.

## Background of the Invention

15 Various inkjet technologies are employed by printer manufacturers including thermal bubble and piezoelectric. In a thermal inkjet printer, tiny resistors create heat and this heat vaporizes ink to create a bubble. As the bubble expands, some of the ink is expelled from the nozzles onto the print medium. By selectively energizing the resistors as the printhead moves across the print medium, the ink is disposed in a pattern on the print medium to form a desired image. Piezoelectric printers convert electrical energy into physical  
20 movement by applying an electrical charge to a piezo crystal located in the back of an ink reservoir associated with each nozzle. Application of an electrical charge causes the crystals to vibrate, thereby forcing ink out of the ink reservoir through the nozzle.

25 Inkjet printers operate using a printhead comprising a plurality of nozzles which spray ink directly onto a print medium. Typically the printhead is an integral part of the print cartridge, the print cartridge further including an ink reservoir. One or more print cartridges are mounted on a movable print carriage. The print carriage moves laterally across the print medium depositing the ink on the print medium in a pattern to form an image.

30 When not in use, the printhead nozzles are sealed by a capping assembly. This is to prevent the ink inside the printhead and cartridge from

drying out and later contaminating the printhead. Any such clogging of the printhead nozzles can adversely affect print quality.

The capping assembly is typically a stationary apparatus mounted within the printer to one side of the print zone. The printhead is brought into alignment  
5 with the capping assembly for sealing of the printheads when the printer is idle.

Since the capping assembly is located outside of the print zone, the minimum width of the printer is the combined width of the print zone and the adjacent capping assembly. The height and width of the printer is an important consideration, particularly in the case of desktop printers since desk space is  
10 often limited. It would therefore be advantageous to provide a printer of reduced height and width. Reducing the overall height and width of the printer may provide additional advantages such as reduced weight and lower cost of manufacture.

It is an object of the present invention to provide a capping assembly  
15 having a space saving design.

#### Summary of the Present Invention

20 Briefly, a printer embodiment of the present invention comprises an inkjet printhead capping assembly that raises up on an elevator to seal the printheads between uses. Such sealing prevents drying of the ink on the printhead nozzles that would otherwise cause clogging and poor operation. The elevator rides up and down on four ramps located at each corner of a cap carriage platform. A  
25 rack and pinion gear pushes pins riding on each ramp laterally to translate into the needed up and down elevator motion.

An advantage of the present invention is that a printer is provided that requires a minimum of space.

30

Attorney Docket No. 700110519-1



### Brief Description of the Drawings

Fig. 1 is a simplified diagram showing a pair of printheads relative to a corresponding pair of sealing caps;

5 Fig. 2 is a perspective diagram of a portion of a printer embodiment of the present invention, and shows an implementation of the capping elevator and how a rack and pinion gear can be used;

10 Fig. 3 is another perspective diagram of the printer of Fig. 2, but with the pinion driveshaft and elevator pin guides removed to provide more detail on the parts that were otherwise hidden;

Figs. 4a, 4b, and 4c, diagram a sequence in which the capping elevator attached to four pins is forced up by the interaction of corresponding ramps and pin guides. The pinion shaft is shown turning clockwise;

15 Figs. 5a, 5b, and 5c, diagram an opposite sequence in which the capping elevator attached to four pins is brought back down by the interaction of corresponding ramps and pin guides. The pinion shaft is shown turning counter-clockwise; and

20 Fig. 6 is a diagram that demonstrates how printer embodiments of the present invention can be made much narrower in overall width because the capping station is within the printing area.

### Detailed Description of the Embodiments

25 Fig. 1 represents an inkjet printer embodiment of the present invention that comprises an ink cartridge carriage assembly 1, a pair of ink cartridges 2, a pair of printheads 3, a pair of caps 4 to prevent ink drying, and a cap elevator 5. During printing, the printheads 3 spray controlled amounts of ink from the cartridges onto the paper. Afterwards, caps 4 are raised up on an elevator to  
30 seal off the printheads to prevent drying of ink in them or on their faces.

Attorney Docket No. 700110519-1

Figs. 2 and 3 represent a capping assembly embodiment of the present invention that details an implementation over the simplified illustration of Fig. 1. A pair of caps 4 ride on top of a cap-carriage elevator assembly 5. A set of four pins 6 are used to keep the whole in a stationary lateral position while still being able to move up and down. A movable plate 7 with four ramps 8 under each pin 6 can be moved back and forth by a rotating driveshaft 9, and a rack gear 10 engaged with a drive pinion 11. The cap-carriage elevator assembly 5 moves up and down in a capping zone 12. The pins 6 are slotted into four corresponding vertical guides 13 which allow limited movement of the cap-carriage elevator assembly 5. A set of four hooks 14 respectively capture pins 6 and lock down the cap-carriage elevator assembly 5, e.g., during printing. In this position the movable plate is forward away from a rear area 15.

Figs. 4A, 4B, and 4C, show the lifting of the cap-carriage elevator assembly 5 from its lowest position, Fig. 4A, its intermediate elevation, Fig. 4B, and its highest elevation, Fig. 4C. There are at each corner of the movable plate 7 and cap-carriage elevator assembly 5, four corresponding sets of pins 6, guides 14, and ramps 8. The pinion 11 is shown turning clockwise against rack gear 10 and that draws the movable plate 7 toward the rear area 15.

Conversely, Figs. 5A, 5B, and 5C, show the dropping back down of the cap-carriage elevator assembly 5 from its highest position, Fig. 5A, its intermediate elevation, Fig. 5B, and its lowest elevation, Fig. 5C. Again, there are at each corner of the movable plate 7 and cap-carriage elevator assembly 5, four corresponding sets of pins 6, guides 14, and ramps 8. The pinion 11 is shown turning counter-clockwise against rack gear 10 and that pushes the movable plate 7 away from the rear area 15.

Fig. 6 is a diagram representing the difference in width over conventional printer mechanism layouts. The capping assembly 17 is typically disposed in prior art printers to one side of the print zone 18, thus making it wider overall. The print zone 18 corresponds approximately with to the width of the print medium. The width of prior art inkjet printers is typically a combination of the width of the print zone 18 and the adjacently disposed capping assembly 17. In

5

order to minimize the width of the printer, the capping assembly 17 is positioned within the print zone 18 of the printer. Positioning of the capping assembly 17 within the print zone 18 allows the width of the printer to be significantly reduced.

5 While some embodiments of the present invention have been illustrated here in detail, it should be apparent that modifications and adaptations to these embodiments may occur to one skilled in the art without departing from the scope of the present invention as set forth in the following claims.

Attorney Docket No. 700110519-1

We claim:

1. A printer, comprising:
  - an inkjet printhead for printing ink;
  - 5 a cap proximate to the inkjet printhead and providing for a sealing of it to prevent drying of unused ink; and
  - an elevator connected to the cap and providing for movement of the cap away from the printhead to allow printing, and allowing for movement to the printhead to allow for sealing and the preventing of ink drying.
- 10 2. The printer of claim 1, wherein:
  - the elevator derives its up and down movement by drawing a movable platform along a set of ramps.
- 15 3. The printer of claim 1, wherein:
  - the elevator includes locks to hold it in its down and away position during printing.
- 20 4. The printer of claim 1, wherein:
  - the elevator occupies an area within a printing zone of the inkjet printhead and thereby provides for a narrower overall width.
- 25 5. The printer of claim 1, further comprising:
  - a rack and pinion gear connected to translate a driveshaft rotation into a lateral motion of a movable plate disposed within the elevator.
- 30 6. The printer of claim 5, further comprising:
  - a set of corner pins and ramps connected to translate said lateral motion of said movable plate into an up and down motion of the elevator.

Attorney Docket No. 700110519-1

7. A method of printing, comprising:

providing an inkjet printhead for printing ink;

locating a cap proximate to the inkjet printhead and using it for a seal to prevent drying of unused ink; and

5 operating an elevator connected to the cap for movement of the cap away from the printhead to allow printing, and for movement toward the printhead to allow for sealing and the preventing of ink drying.

8. The method of claim 7, wherein:

10 the operating of the elevator is such that it derives its up and down movement by drawing a movable platform along a set of ramps.

9. The method of claim 7, wherein:

15 the operating of the elevator includes locking it to hold its down and away position during printing.

10. The method of claim 7, wherein:

the operating of the elevator occupies an area within a printing zone of the inkjet printhead and thereby provides for a narrower overall width.  
20

11. The method of claim 7, further comprising:

using a rack and pinion gear to translate a driveshaft rotation into a lateral motion of a movable plate disposed within the elevator.

25 12. The method of claim 11, further comprising:

using a set of corner pins and ramps to translate said lateral motion of said movable plate into an up and down motion of the elevator.

Attorney Docket No. 700110519-1

**INKJET CAPPING ELEVATOR****Abstract of the Disclosure**

5

A printer comprises an inkjet printhead capping assembly that raises up on an elevator to seal the printheads between uses. Such sealing prevents drying of the ink on the printhead nozzles that would otherwise cause clogging and poor operation. The elevator rides up and down on four ramps located at each corner of a cap carriage platform. A rack and pinion gear pushes pins riding on each ramp laterally to translate into the needed up and down elevator motion.

10

Attorney Docket No. 700110519-1

TITLE: A Horizontally Transferable Capping Mechanism  
INVENTOR(S): Ah Chong TEE et al.  
HP PDNO. 700110519-1

1/3

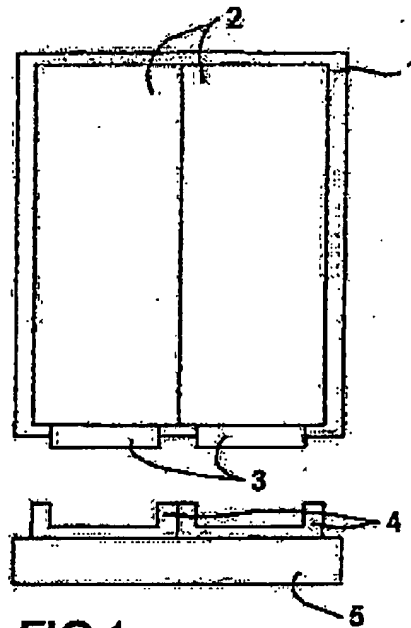


FIG 1

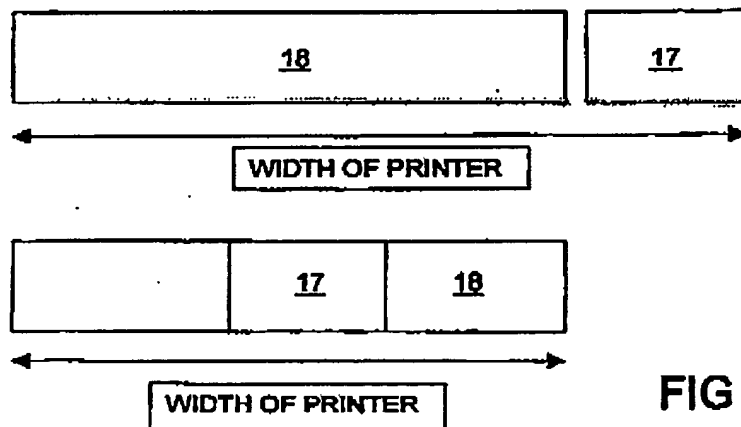
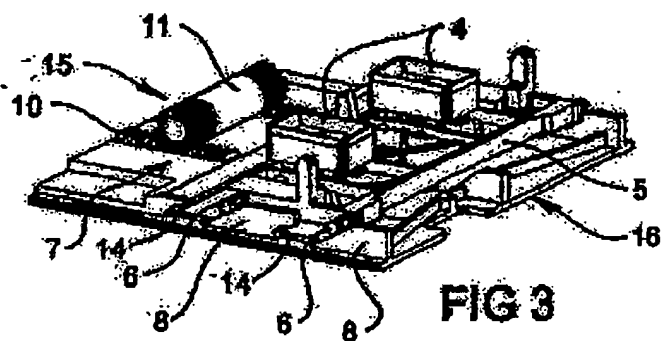
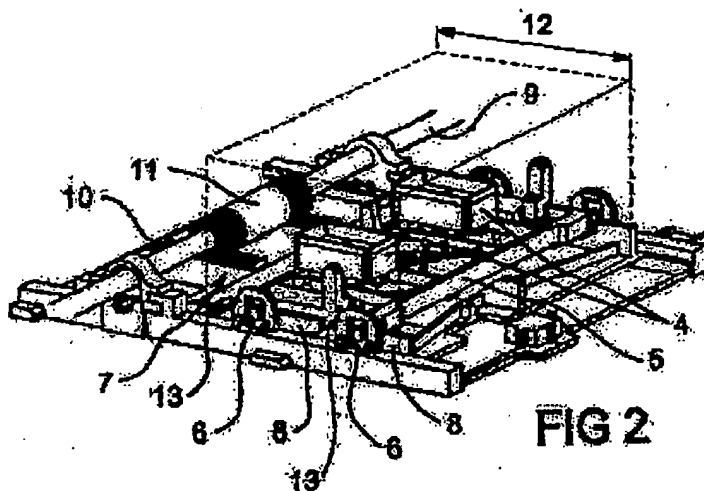


FIG 6

TITLE: A Horizontally Transferable Capping Mechanism  
INVENTOR(S): Ah Chong TEE et al.  
HP PDNO. 700110519-1

2/3



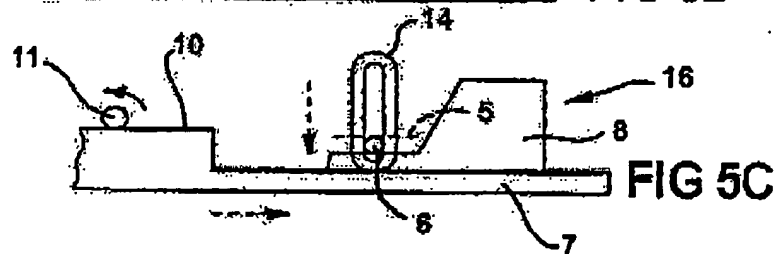
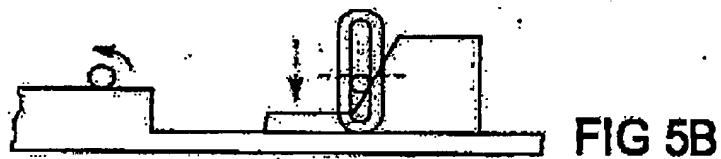
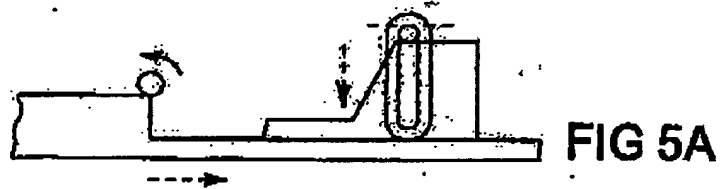
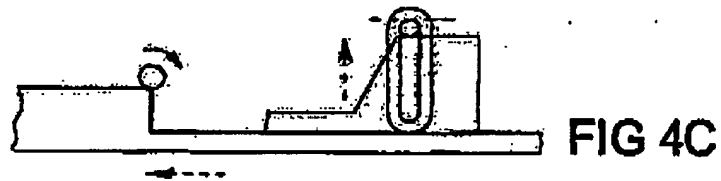
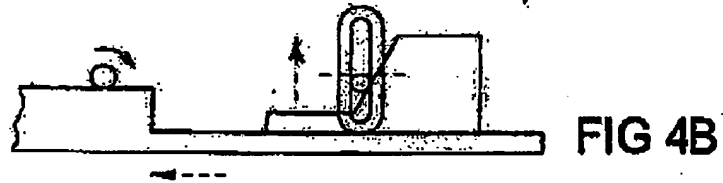
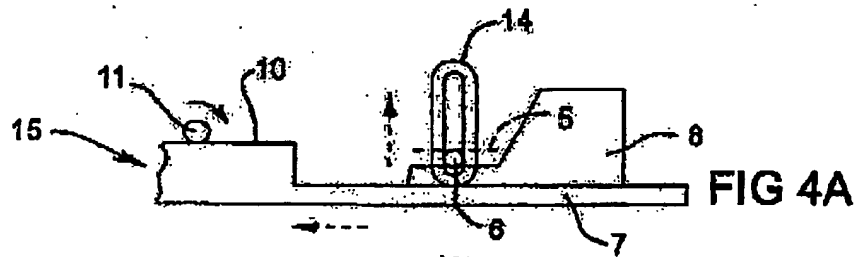


## TITLE: A Horizontally Transferable Capping Mechanism

INVENTOR(S): Ah Chong TEE et al.

HP PDNO. 700110519-1

3/3



JUN. 17. 2004 9:46AM

HP LEGAL

NO. 4499 P. 20

Dear Sir:

Please acknowledge receipt of the following document(s)  
RE: U.S. Patent Application PD No. 700110519-1 Atty: RBM  
Inventor(s): Ah Chong Tee, et al

Title: A Horizontally Transferable Carrier Mechanism

☒ Transmittal Letter, (in duplicate)  
☐ Page(s) of specification, claims & abstract; ☐ claims total  
☒ Declaration and Power of Attorney ☐ signed or ☒ unsigned or partial)  
☐ Sheet(s) of drawings  
☒ Certificate of Mail dated July 11, 2003  
Label No. EV104130542US

93207 U.S. PTO

10/618402

07/11/03